Surface Water & Sediment Monitoring
Upper Stewart Creek
April 25, 2012

Background:

On April 23, 2012, a community meeting organized and led by State Representative Kelly Alexander was held at the West Charlotte Recreation Center. Mr. Alexander invited the North Carolina Department of Environment and Natural Resources (NCDENR, Division of Waste Management's Brownfields Program) to attend and receive comments regarding Brownfield Project Number 14006-10-60, located at 1016 & 1024 Montana Drive in Charlotte, N.C. During this meeting, residents expressed concerns regarding the water quality conditions in Stewart Creek, which runs through their neighborhoods. Charlotte-Mecklenburg Storm Water Services agreed to work with NCDENR to quantify these conditions for reporting back to the community at the next scheduled public meeting.

Goal of the Monitoring Plan:

Provide an analysis of general water quality conditions in the main stem of Stewart Creek upstream of Brookshire Freeway.

Monitoring Protocols:

Grab samples will be collected for one (1) monitoring event during base flow conditions when turbidity levels in the stream are $\leq$10 NTUs based off automated monitoring data collected at site # MC22A located downstream. All samples will be collected by staff of Charlotte Mecklenburg Storm Water Services during the month of May 2012. The Standard Operating Procedure that will be followed in the collection of these grab samples is provided in Attachment 1.

Monitoring Sites:

Water quality monitoring will be performed at eight (8) sites upstream of Brookshire Freeway on Stewart Creek with additional sediment sampling performed at two (2) of these sites as identified in Attachment 2.

Monitoring Parameters:

Water samples will be analyzed for the following parameters:

- Temperature (Field)
- Dissolved Oxygen (Field)

- Conductivity (Field)
- pH (Field)
- Fecal Coliform Bacteria
- E-Coli Bacteria
- Enterococcus Bacteria
- Ammonia Nitrogen
- Nitrate + Nitrite
- Total Kjeldahl Nitrogen
- Total Phosphorus
- Total Suspended Solids (TSS)
- USGS Suspended Sediment Concentration (SSC) Test
- Turbidity (Lab)
- Hardness
- Biochemical Oxygen Demand
- Chemical Oxygen Demand
- Oil and Grease (HEM)
- Volatile Organic Compounds (EPA Methods 8260)
- Semi-Volatile Organic Compounds (EPA Method 8270)
- Metals (antimony, arsenic, beryllium, cadmium, chromium (trivalent and hexavalent), copper, lead, manganese, mercury, nickel, selenium, silver, thallium, and zinc)

Soil samples will be analyzed for the following parameters:

- Volatile Organic Compounds (EPA Methods 8260)
- Semi-Volatile Organic Compounds (EPA Method 8270)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Metals (antimony, arsenic, beryllium, cadmium, chromium (trivalent and hexavalent), copper, lead, manganese, mercury, nickel, selenium, silver, thallium, and zinc)

ATTACHMENT 2
STANDARD OPERATING PROCEDURE

DIRECT GRAB SURFACE WATER SAMPLE COLLECTION

Mecklenburg County
Land Use and Environmental Services Agency
Water Quality Program

Jon Beller	Sr. Environmental Specialist	Project Officer
Jeff Price	Environmental Analyst	QA/QC Officer
Rusty Rozzelle	Water Quality Program Manager	

City of Charlotte
Engineering and Property Management
Storm Water Services

Steve Jadlocki	Sr. Water Quality Specialist	
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Charlotte-Mecklenburg Storm Water Services
Charlotte, NC

Standard Operating Procedure
Modification / Review Log

Version	Eff. Date	Author	Summary of Changes	Approved	Date
1.0	2/26/07	Jeff Price	Original Draft	Jeff Price	7/27/07
1.1	1/1/08	Jeff Price	Formatting changes – minor	Jeff Price	1/1/08
1.2	1/1/09	Jeff Price	Field Validation, minor formatting changes.	Jeff Price	1/1/09
1.3	4/23/09	Jeff Price	J. Beller comments included.	Jeff Price	4/23/09
1.4	9/08/11	Jon Beller	Minor updates	Jeff Price	9/8/11

1.0 Scope and Applicability

1.1 This SOP is applicable to the direct grab sample collection of representative surface water for the analysis of chemical, physical, and bacteriological parameters.

2.0 Summary of Method

2.1 Representative surface water samples are collected directly from either free flowing or impounded water sources in certified clean, pre-preserved bottles suitable for relevant laboratory analysis. All samples are submitted to a NC State certified laboratory for the analysis and quantification of surface water parameters.

3.0 Health and Safety Warnings

3.1 Surface water sampling poses a number of inherent risks, including steep and hazardous terrain negotiation, deep and/or swift moving water, stinging insects and occasional contact with wild animals. Caution should always be exercised and personal safety considerations must be considered paramount.

3.2 Universal precautions should be exercised when exposed to urban surface waters with unknown potential for contamination. Always wear gloves when sampling and decontaminate hands frequently using a no-rinse hand sanitizer.

3.3 Sampling activities conducted from a boat pose additional risks related to boating accidents and drowning. Always obey all boating safety regulations and wear Personal Floatation Devices on-board at all times.

3.4 Sample collection containers utilized by Charlotte-Mecklenburg Storm Water Services and the Charlotte-Mecklenburg Laboratory are pre-preserved. Some of these containers are preserved with approximately 2ml of concentrated acid. Caution should be taken when opening, storing and transporting these containers. Always make sure caps a tightly screwed in place.

4.0 Interferences

4.1 Improper sample collection location. Great care must be exercised to identify a well-mixed zone in free flowing waters so that samples are representative.

4.2 Improper sample technique. Sample bottles used in this procedure are pre-preserved. Great care must be exercised to fill the bottles without overfilling. Too much sample in a pre-preserved container can dilute the effectiveness of the preservative. VOC samples must have no air bubbles trapped in the bottles.

4.3 Always wear non-powdered gloves. Powder from the gloves can contaminate samples. Keep in mind that protective gloves protect the sampler, not the sample. Protective gloves are not certified-clean or sterile. Any contact with the sample or with the sample container will potentially contaminate the sample.

4.4 Cross-contamination of samples during transport. Always place filled samples collection bottles (samples) upright in the cooler so that the neck and cap are above the level of the ice. Drain ice melt-water from coolers periodically to ensure that sample bottles are not submerged.

5.0 Equipment and Supplies

5.1 The following equipment is generally needed for Direct Grab Sample Collection of representative surface water:

- CMU Lab Chain of Custody Form (Attachment 11.1)
- CMU Sample Collection Bottle Selection Guidance Chart (Attachment 11.2)
- Certified clean, pre-preserved sample collection bottles appropriate for intended parameter analysis (provided by CMU)
- Sample bottle self-adhesive labels
- 4-liters of lab distilled/de-ionized reagent grade water
- CMU lab sterilized buffered bacteriological blank solution
- Sharpie, pen
- Map Book
- Cooler
- Ice
- Non-Powdered Gloves
- Hip waders, rubber boots
- Hand sanitizer
- Hand-held temperature probe

6.0 Field QC Blank Collection

6.1 Label the blank bottles with the approximate Sample Collection Time (+/- 5 minutes).

6.2 Remove the cap from the distilled/de-ionized reagent grade water or the sterilized buffered bacteriological blank solution as appropriate.

6.3 Place the blank collection bottle(s) on level, stable surface. Remove the caps and fill the blank collection bottle(s) to the bottom of the neck or to the indicated mark with the appropriate blank solution, approximately 80-90% full. Be careful not to

overfill the blank collection bottles unless the blank is for VOC parameters. VOC blanks should be overfilled as described in 9.4.

6.4 Replace the sample collection bottle cap(s). For VOC blanks, follow the cap replacement guidance detailed in 9.5-9.7.

7.0 Chemical / Physical Direct (Grab) Sample Collection

7.1 Label the sample collection bottles with the approximate Sample Collection Time (+/- 5 minutes).

7.2 Locate the appropriate sample site, bearing in mind the sampling considerations outlined in 4.1 and 4.2.

Note: Make sure sampling site is located upstream of any immediate disturbance to the stream, including the YSI probe if utilized for field measurement collection, unless the impact of the disturbance is the reason for sampling.

7.3 Remove the sample collection bottle cap.

7.4 Tilt the sample collection bottle down at approximately 45° angle, and submerge ½ of the bottle mouth, facing upstream from where you are standing. Fill tapered sample collection bottles to the bottom of the neck, approximately 80-90% full. Do not "scoop" sample as this may stir the sediment on the bottom and affect sample. Do not overfill bottle!

7.5 Hold the filled bottle upright and replace the cap.

8.0 Bacteriological Direct (Grab) Sample Collection

8.1 Carefully open the sterile sample collection bottle cap. Be sure not to contact any inside surface of the bottle cap or the bottle. There are no longer cap tabs.

8.2 Holding the bottle by the sides, tilt the bottle at approximately 45° angle. Dip the bottle mouth ½ submerged, upstream from where you are standing. Submerge until the bottle is full to the indicated 100ml volume.

Note: For stream samples, do not overfill bottle. However, for lake samples fill the bottle above the line to collect extra volume. Leave only a small headspace. If bottles are accidentally overfilled, it is acceptable to pour out a small amount of sample volume, just be sure not to lose the preservative/dechlor pellet or powder!

8.3 Hold the filled bottle upright and replace the cap.

9.0 Volatile Organic Chemical (VOC) Direct (Grab) Sample Collection

9.1 Carefully open 2 sample collection bottles (vials) for each sample collected by removing the red caps.

9.2 Tilt the base of each sample collection bottle down at approximately 45° angle.

9.3 Submerge each entire bottle in an upright position, facing upstream from where you are standing.

9.4 Fill both VOC sample collection bottles to the top (100% full), plus a meniscus.

9.5 Hold the filled bottles upright to replace the caps.

9.6 Carefully displace excess sample water from under the cap as you tighten.

9.7 Turn the sample collection bottles upside down and check for any trapped air bubbles under the cap or in the bottle. If any air bubbles are present, discard the sample from the vials and repeat beginning at step 9.2.

10.0 Post-Sample Collection

11.1 Using the hand-held temperature probe, measure the water temperature directly from the surface water source, not from the sample collection bottle.

11.2 Record the water temperature on the appropriate lab COC form.

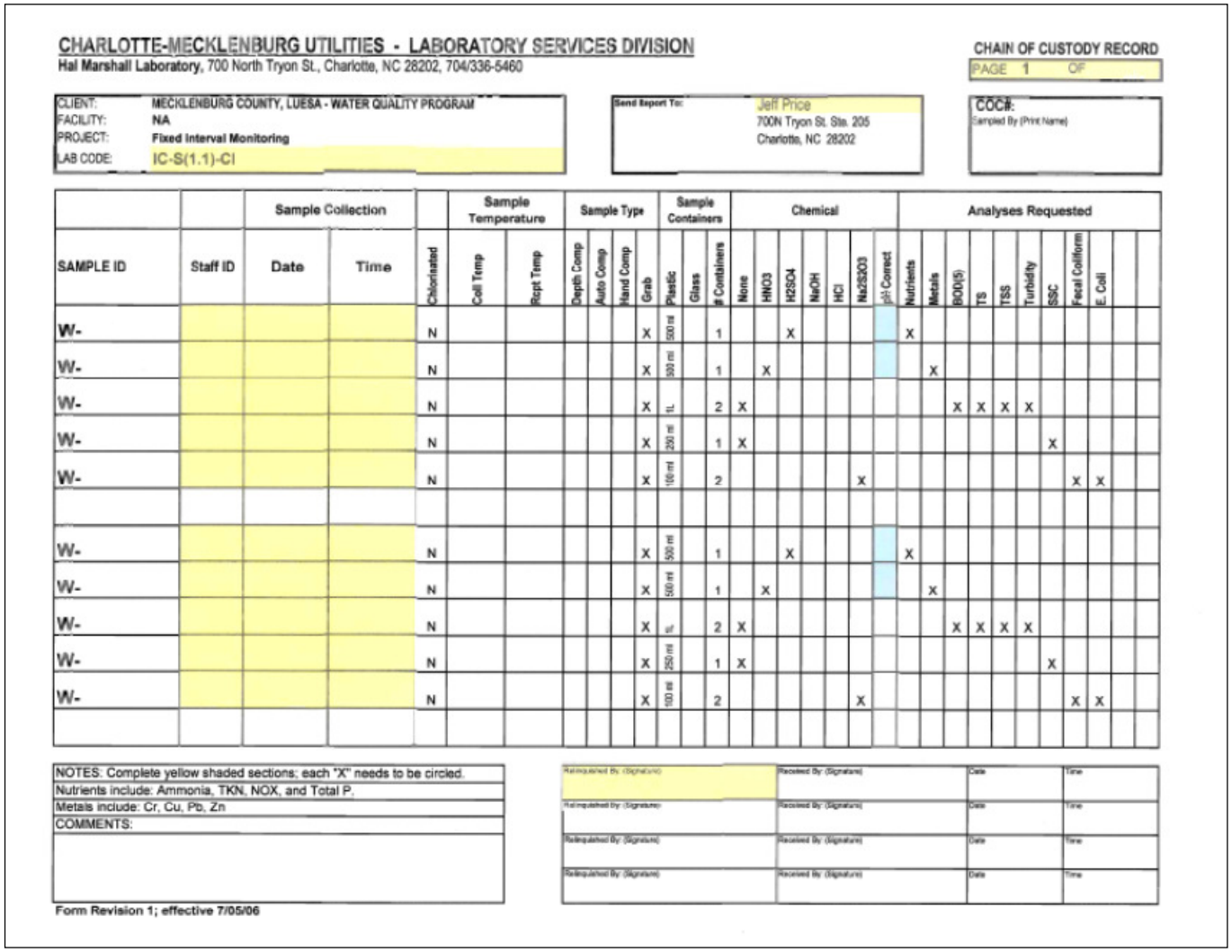
11.3 Place all sample collection bottles (and blanks) upright in the cooler. Do not submerge sample bottles in ice-melt water as indicated in 4.3.

11.4 Complete the COC.

11.5 Deliver all sample bottles in the cooler on ice to the CMU Lab for analysis.

11.0 Attachments

13.1 CMU Chain of Custody Form (Example)



CHARLOTTE-MECKLENBURG UTILITIES - LABORATORY SERVICES DIVISION
Hal Marshall Laboratory, 700 North Tryon St., Charlotte, NC 28202, 704/336-5460

CHAIN OF CUSTODY RECORD
PAGE 1 OF

CLIENT: MECKLENBURG COUNTY, LUESA - WATER QUALITY PROGRAM
FACILITY: NA
PROJECT: Fixed Interval Monitoring
LAB CODE: IC-S(1.1)-CI

Send Report To: Jeff Price
700N Tryon St. Ste. 205
Charlotte, NC 28202

COC#:
Sampled By (Print Name)

		Sample Collection			Sample Temperature		Sample Type				Sample Containers			Chemical							Analyses Requested										
SAMPLE ID	Staff ID	Date	Time	Chlorinated	Cell Temp	Rept Temp	Depth Comp	Auto Comp	Hand Comp	Grab	Plastic	Glass	# Containers	None	HNO3	H2SO4	NaOH	HCl	Na2S2O3	pH Correct	Nutrients	Metals	BOD(5)	TS	TSS	Turbidity	SSC	Fecal Coliform	E. Coli		
W-				N						X	500 ml		1			X					X										
W-				N						X	500 ml		1		X							X								
W-				N						X	1L		2	X									X	X	X	X				
W-				N						X	250 ml		1	X													X			
W-				N						X	100 ml		2						X									X	X	
W-				N						X	500 ml		1			X					X										
W-				N						X	500 ml		1		X							X								
W-				N						X	1L		2	X									X	X	X	X				
W-				N						X	250 ml		1	X													X			
W-				N						X	100 ml		2						X									X	X	

NOTES: Complete yellow shaded sections; each "X" needs to be circled.
Nutrients include: Ammonia, TKN, NOX, and Total P.
Metals include: Cr, Cu, Pb, Zn
COMMENTS:

Relinquished By: (Signature)	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Received By: (Signature)	Date	Time
Relinquished By: (Signature)	Received By: (Signature)	Date	Time

Form Revision 1; effective 7/05/06

13.2 CMU Sample Collection Bottle Selection Guide

Attachment 2
Water Quality & Sediment Monitoring Locations on Stewart Creek